Who Benefits from the
Ontario University System

A Benefit-Cost Analysis by Income Groups

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Contents

Acknowledgments

Chapter 1
Introduction

Canadian post-secondary education has undergone unprecedented changes during the last fifteen years, in response partly to the human capital revolution and partly to the post-war baby boom. The 1960's witnessed a tremendous growth of university enrolments and expenditures, in addition to the creation of a province-wide network of new colleges of applied arts and technology. By the end of the decade, however, the boom in the post-secondary sector began to show signs of peaking. Fears of serious underinvestment common in the early 1960's were replaced by evidence of declining rates of return on educational investment,[1] while newspaper commentators talked of a taxpayers' revolt against the rising public cost of higher education.

In the light of changing fiscal and economic conditions in Canada and Ontario (as in other countries),[2] questions of equity and efficiency began to acquire prominence in public discussion of aims, constraints, and alternatives in higher education. Why should society as a whole subsidize

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1   For comparative rates of return as at 1961, 1969, and 1972 see my 'Economic Returns on Human Capital Formation in Canadian University Education, 1961 to 1972,' *Relations Industrielles/Industrial Relations,* Vol. 32, No. 2, 1977. See also, D. A. Dodge and D. A. A. Stager, 'Economic Returns to Graduate Study in Science, Engineering and Business,' *Canadian Journal of Economics* Vol. 5, No. 2, May 1972, which provide cross-sectional evidence using 1966 data for the stated fields of study. Other related studies are presented in S. Ostry, ed. *Canadian Higher Education in the Seventies,* Economic Council of Canada, May 1972 (Ottawa).

2   For a survey of OECD countries, see Organization for Economic Cooperation and Development, *Public Expenditure on Education: A Forward Look,* CPE/WE2(74)2, Paris, 25 June 1974. For a recent assessment of the American higher education, see R. B. Freeman, 'Overinvestment in College Education,' *Journal of Human Resources,* Vol. 10, No. 3, 1975, and also Freeman's earlier study, *The Market for College Trained Manpower* (Cambridge: Harvard University Press, 1971).

universities if the benefits generated are largely enjoyed by a relatively small and privileged group? Can the old externality argument(3) about net social benefits justify an elitist system of university education? Is not the externality argument itself subject to the law of diminishing returns?

These questions are especially timely for Ontario. First, there has been relatively little empirical analysis of the distributive effects of universities.(4) Secondly, and more significantly, recent evidence(5) suggests increased inequality in the size distribution of Canadian personal income, despite tremendous growth of transfer and public expenditure programs in the post-war years. Since university financing is heavily dependent on public expenditure, with obvious impact on income distribution, it would be highly desirable to evaluate its distributive effects. Although the conventional wisdom, especially amongst university administrators and the 'informed' general public, is that the Ontario universities do in fact have a regressive redistributive effect, this has not been documented or measured.

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3   External benefits of higher education are third-party or neighbourhood benefits generated by universities or university-trained persons and traditionally have included better citizenship qualities, more informed participation in community and national affairs, and so on. A comprehensive study of the subject is in Burton A. Weisbrod, *External Benefits of Public Education, An Economic Analysis* (Princeton University, Industrial Relations Section, 1964). A critique of the externality argument as a justification for increased government intervention in the economy is given in R.H. Coase, 'The Problem of Social Cost,' *Journal of Law and Economics,* Vol. 3, October 1960.

4   Earlier studies include R.W. Judy, 'The Income-Redistributive Effects of Aid to Higher Education,' in L.H. Officer and L.B. Smith, eds, *Canadian Economic Problems and Policies* (Toronto: McGraw-Hill, 1970); J.F. Crean, 'The Income Redistributive Effects of Public Spending on Higher Education,' *Journal of Human Resources* Vol. 10, No. 1, Winter 1975.

5   Thus the ratio of the income share of the top quintile to that of the lowest quintile for all Canadian families and unattached individuals rose from 9.4 to 10.6 during 1965 to 1974. See Statistics Canada, *Income Distributions by Size in Canada 1974,* Cat. No. 13-207, Annual, Table 53, 79.

The central assumptions of this study are, first, that universities are wealth creators, over and above other functions they perform, such as being repositories of knowledge or research centres, and, second, the process of wealth creation in universities reflects a set of investment decisions *jointly* made by parents and students. Therefore, investment in future human capital formation in universities can be evaluated, using the human capital theory, from the standpoint of groups of socioeconomic classes (e.g. parents of students) rather than from that of the individual student.

For empirical reasons to be explained more fully presently, the central reference group in this study is the full-time male graduates of bachelor degree programs completing their studies in the Ontario universities in spring 1974. These graduates are traced back to specific parental income groups, using fathers' income as the basis for this classification, as revealed in the Statistics Canada's *Post Secondary Student Survey (PSSS 1974-75)* conducted in February 1975. Likewise, the taxpayers' costs of producing the class of 1974 male graduates are allocated among the same parental income groups, and finally the group benefits and costs are derived in terms of 1970 present values. The selection of 1970 for the comparison of benefits and costs, of course, is determined by the fact that the class of 1974 graduates began their schooling four years before, so that 1970 was the date of the human capital investment decision by parents and students collectively.

Specifically, this study is concerned with the following questions:

- What is taxpayers' cost of producing human capital embodied in the 1974 male graduates of Ontario universities? What are the shares of the various income-groups of the total taxpayers' cost?

- What is the amount of the economic benefits generated by the volume of human capital embodied in the 1974 male graduates? How is this amount shared among the various income groups?

- What are the redistributive effects of these benefits and costs from the standpoint of specific income groups?

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ASSUMPTIONS AND LIMITATIONS

Figure 1 depicts the basic elements of the human capital theory utilized in this study. I assume that university education among other things develops or certifies in graduates certain skills and specialized knowledge that generate additional income following graduation. This additional income (relative to, say, the income of a high-school graduate) represents the return on educational outlays incurred during the period of university attendance. The additional income, realized during the graduate's working life through to retirement (i.e. for a period of about forty-three years from age 22 to 65), accrues as an income stream and is comparable to the revenue earned by an investor from a physical capital asset. In Figure 1, this additional income is represented by the area
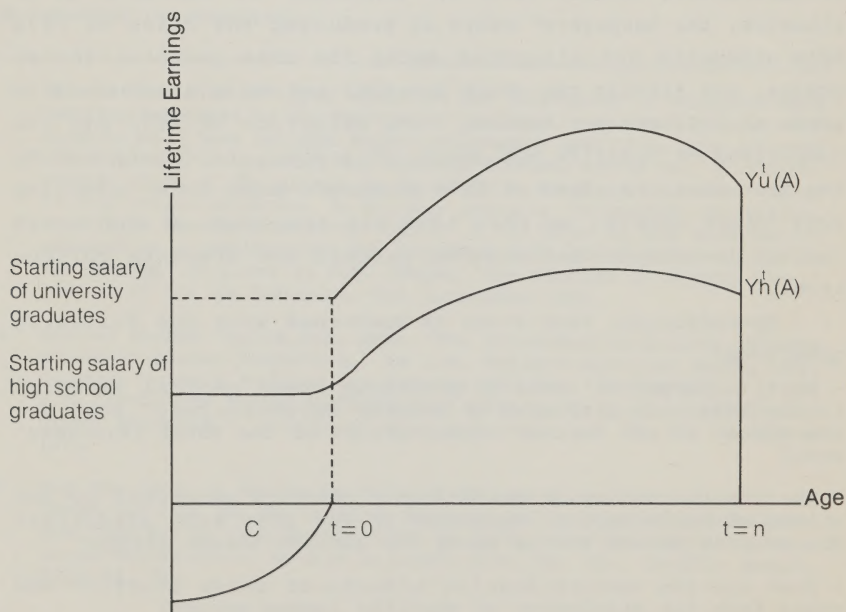

FIGURE 1   The Basic Human Capital Model

between $Yu^t(A)$ and $Yh^t(A)$ over the range $t = 0$ and $t = n$. By means of standard discounting techniques, the additional lifetime earnings can be cumulated and converted to present value at a specific date. Likewise, the educational costs, represented by the area C in Figure 1, can be converted to the same basis in order to calculate yield rates or internal rates of return for investment decision-making purposes.

During the last ten years of so, there have been hundreds, possibly thousands, of empirical applications of the 'human capital' theory, patterned after the pioneering studies of Becker, Schultz, Hansen, and others.(6) In Canada, the Economic Council of Canada, Statistics Canada, and others(7) have undertaken various further studies. Yet, despite its great popularity, the human capital theory has been attacked on both conceptual and empirical grounds almost from its beginning.(8) In recent years, a new and powerful school of thought has emerged as a radical alternative to it: the screening hypothesis. Associated with such celebrated names as Arrow,

6   G. Becker, *Human Capital, A Theoretical and Empirical Analysis* (New York: NBER, 1964); T.W. Schultz, 'Investment in Human Capital,' *American Economic Review,* March 1961; W. Lee Hansen, editor, *Education, Income and Human Capital* (New York: NBER, 1970). Besides the *Journal of Human Resources,* representative studies may be found in G. Psacharopoulos, *Returns to Education: An International Comparison* (Elsevier, 1973); M. Blaug, *An Introduction to the Economics of Education* (London: Penguin, 1972).

7   *Economic Council of Canada, Second Annual Review: Toward Sustained and Balanced Growth,* (Ottawa, 1965) was an influential report for an expansionary higher education policy in Canada. Subsequent views of the EEC are contained in its seventh and eighth annual reviews. J.R. Podoluk, *Earnings and Education,* Statistics Canada, Cat. No. 91-510, December 1965; Statistics Canada, Education Division, *Education Planning and the Expanding Economy,* Cat. No. 81-524, October 1964. *Financing Higher Education in Canada,* Report of a Commission to the Association of Universities and Colleges of Canada, published for the AUCC by University of Toronto Press and Les Presses de l'Universite Laval, 1965; *The Learning Society,* Report of the Commission on Post-Secondary Education in Ontario (Toronto, 1972).

8   J. Vaizey, *The Economics of Education,* (London: Faber and Faber, 1962); OECD Study Group in the Economics of Education, *The Residual Factor and Economic Growth* (Paris, 1964); S. Bowles and H. Gintis, 'The Problem with Human Capital Theory - A Marxian Critique,' *American Economic Review,* Vol. 65, No. 2, May 1975.

Chiswick, and Thurow,(9) the screening hypothesis or theory of 'credentialism' contends that the contribution performed by the universities is simply that of providing an inexpensive selection or filtering device for employers; their training function is minimal, partly because skills are actually developed on the job after graduation, and partly because students possess innate personality traits such as ability and cognitive skills. Therefore, the proponents of the screening hypothesis argue, the economic returns attributed to university education are artificial, unjustified, and misleading.

Of special importance for educational policy and planning, the screening hypothesis implies that government-sponsored expansion of university education is unlikely to have any impact on earning differentials because an increased supply of graduates will simply induce employers to upgrade their hiring standards, affecting every potential job-seeker equally. Thus the end result may well be overtrained university graduates.(10) In that case, however, certain redistributive effects would be generated since the students from poorer families may be more handicapped than those from rich and influential families.

This is not the place to argue the merits and demerits of the screening hypothesis.(11) While it may challenge the standard human capital theory, it does not invalidate the present study. For whether the economic benefits of university

9   K. Arrow, 'Higher Education as a Filter,' *Journal of Public Economics*, Vol. 2, No. 3, July 1973; B.R. Chiswick, 'Schooling, Screening and Income,' in L.C. Solmon and P.J. Taubman, eds, *Does College Matter?* (New York: Academic Press, 1973); L.C. Thurow, 'Measuring the Economic Benefits of Education,' in M.S. Gordon, ed., *Higher Education and the Labor Market* (New York: McGraw-Hill, 1974). See also P. Taubman and T. Wales, *Higher Education and Earnings. College as an Investment and a Screening Device* (New York: McGraw-Hill, 1974).

10 Richard B. Freeman, *The Over-Educated American* (New York: Academic Press, 1976).

11 For a recent comprehensive survey of the relevant literature, see M. Blaug, 'The Human Capital Theory: A Slightly Jaundiced Survey,' *Journal of Economic Literature,* Vol. 14, No. 3, September 1976.

education are regarded as returns on educational investment (as human capital theorists would argue) or as returns on a selection mechanism (as the screening theorists would contend), the findings still have merit both on theoretical grounds and for policy because they are concerned with the equity and income-redistributive effects of university education (not with its yield rate). Furthermore, benefits and costs are computed from the standpoint of groups of parents (not from that of a private investor). Even if universities tend to function as elitist institutions or add to labour market discrimination, human capital theory can still be used as an analytical tool to measure the redistributive effects created in the process.

My central assumption is that university education represents a shared or joint investment by parents and students.(12) Although there are significant divergences of costs and benefits between parents and students, the common or complementary objectives are important enough to justify the assumption of joint investment. The parents pay the public cost of universities through taxes and in return derive benefits through their children's additional income, improved status, or upward social mobility. In economic terms, parents invest to alter the pattern of income distribution. A poor father might exhort his young son to go to university to become 'somebody.' An American television advertisement for the Negro College Fund shows a black mother scrubbing an office floor so that her son can go to college.

Are such expectations realized through the existing university system in Ontario? While the university may perform a variety of functions, it also serves a social anti-poverty

12 This is by no means an original idea. For example, Alfred Marshall, who in 1890 wrote that 'the most valuable of all capital is that invested in human beings,' explicitly recognized the parents' role in the educational and career choices of their siblings. See his *Principles of Economics* (London: Macmillan, 1962) 564 and 456-7. J.F. Crean, 'The Income Redistributive Effects,' accepts the joint-investment concept. This concept is also basic to the standard Gary Becker - Jacob Mincer model of on-the-job training: 'On-the-job training; cost, returns, and some implications,' *Journal of Political Economy*, Vol. 70, 1962; Becker, *Human Capital*.

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mechanism, a function recognized by the egalitarian principles (e.g. equality of opportunity or access) long enshrined in educational philosophy and policy.(13) To the extent that the university acts this way it should have a progressive (pro-poor) impact on income distribution; if it is in fact regressive (pro-rich), why should it be a 'public good' supported by the general taxpayer?

GENERAL VS PARTIAL ANALYSIS

Since university education is only one public expenditure program among many, it may be argued that an evaluation of its income-redistributive effects is incomplete if based on partial rather than general analysis, that is, on analysis of it as an isolated program. A regressive university system need not be unacceptable if other programs are sufficiently progressive. In Ontario and Canada there exist many income-transfer and welfare programs evidently in favour of the poor, so that a university system unequally favouring the rich might be thought harmless.

There are two major faults with such an argument. First, an elitist institution subsidized by public funds is strongly inconsistent with the principles of 'user cost' and 'ability to pay.' It is unethical that an inordinate proportion of the subsidies to universities should be used to provide a service below full cost to a student body drawn largely from wealthy families able to pay the full cost themselves. Why should the poor subsidize students in the medical and law schools if most of them are from rich families? Secondly, maintaining the poor through income transfer and welfare programs (however progressively arranged) cannot justify an elitist university system.

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13 For a comprehensive reassessment of the liberal progressive tradition in public education in the USA, see Christopher Jencks, et al., *Inequality. A Reassessment of the Effects of Family and Schooling in America* (New York: Basic Books, 1972). On the Canadian educated elites, see John Porter, *The Vertical Mosaic* (Toronto: University of Toronto Press, 1967) esp. chaps 5, 10-18.

The two alternatives are not comparable. Income transfers keep the poor functionally poor, whereas university education offers a chance to break out of the poverty cycle. If there is one case of public good where equal accessibility and opportunity for enjoyment are critically important, it is higher education.

For these reasons a partial equilibrium analysis of the income redistributive effects of university education in Ontario is theoretically and empirically valid.

THE BASIS OF THE PRESENT BENEFIT-COST EVALUATION

A benefit-cost evaluation of a project rests on some type of with/without comparison, that is, benefits and costs are computed by comparing a situation with the project to an alternative situation without it. Doing this for university education presents a conceptual problem since it would be unrealistic to imagine a situation without university education. However, there may be feasible and desirable alternatives in the availability and financing of university education, in particular, a choice between a restrictive system based on elitist accessibility and a more open system responsive to the principle of equality of opportunity.

In this study the comparison implicit in the benefit-cost evaluation is of the second type. We begin by looking at the current university system in Ontario and compare it to a hypothetical alternative system with a neutral impact on income distribution between different socioeconomic groups. Thus, the theoretical yardstick is a university system generating a benefit-cost ratio of exactly 1.0 for every socioeconomic group, each group's derived benefit equaling its share of university cost. If the actual benefit-cost ratio for a specific group turns out to be less than 1.0, that group is made worse off by the current method of supplying and financing university education, while a ratio greater than unity implies relative gain. If the benefit-cost ratio turns out to be significantly less than 1.0 for the 'poor' or low-income groups but significantly higher than 1.0 for the higher income groups,

the existing system of university education is regressive, that is, it shifts income from the poor to the rich.

THE CONCEPT OF EQUITY IN UNIVERSITY EDUCATION

The concept of equity in universities used in this study does not mean greater equality of opportunity for students from poor families merely in a theoretical or philosophical sense. Rather it means a fairer relationship between the actual costs and benefits of universities for different socioeconomic groups in Ontario. Ideally, each group should recover in benefits its share of university costs; in more practical terms, the disparaties should be minimized through deliberate public policy measures, especially progressively organized student aid programs and more open admissions policies in the universities.

For clarity let us distinguish between ex-ante and ex-poste equity.(14)   Equal accessibility or opportunity is an ex-ante concept. It merely provides for equal theoretical chances to go to university and would be quite consistent with a thoroughly unfair or unequal outcome - if, for example, the poorer families did not actually take advantage of their theoretical equal access chances or there were serious financial or other impediments preventing the exercise of their equal opportunities. This study is interested in measuring the ex-post redistributive impact of universities. In other words, ex-ante equity is a necessary but not a sufficient condition for an egalitarian university system; the latter must also satisfy the ex-post concept of equity.

METHOD OF STUDY AND DATA SOURCES

Previous empirical studies in this field have compared the tax burden and graduation shares or educational subsidies for different income groups. The pioneering study by Hansen and

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14 Mark Pauly and Thomas Willett, 'Two Concepts of Equity and their Impli-cations for Public Policy,' *Social Science Quarterly,* Vol. 53, No. 1, June 1972.

Weisbrod for California, which found significant regressivity,
was a comparison of tax paid and subsidy received through the
state university system by various income groups.(15)   The Judy
study for Canada was based on the relationship between tax
shares and enrolment shares for different categories of parents
classified according to income.(16)   Neither of these studies
included student aid from public funds in the calculation of
net education costs, nor, more significantly, did they regard
university education an investment activity generating
additional lifetime earnings, even though these earnings
constitute the benefits of higher education.   Admittedly, to do
this would have required much more data giving great detail
about education/earning profiles, courses of study, and the
socioeconomic backgrounds of students.

      As a result of Statistics Canada's *Post-Secondary Student
Survey 1974-75,* much of the data needed for a detailed appli-
cation of the human capital theory to an empirical evaluation
of the income-redistributive effects of university education in
Canada are now available.(17)   This valuable source is the
basis of the present study.   In addition, two other major data

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15 W. Lee Hansen and Burton A. Weisbrod, *Benefits, Costs and Finance of
    Higher Education* (Chicago: Markham, 1970).   Part of this book was
    published as an article entitled 'The Distribution of Costs and Direct
    Benefits of Public Higher Education: The Case of California,' in
    Journal of Human Resources, Vol. 4, No. 2, Spring 1969. The Hansen-
    Weisbrod finding of a sizable regressive effect in California higher
    education was challenged by several persons in the pages of the *Journal
    of Human Resources:* See the articles by Joseph A. Penchman in Vol. 5,
    Summer 1970; E. Cohn, A. Gifford, and I Sharkansky in Vol. 5, Spring
    1970; and the reply by Hansen and Weisbrod in Vol. 6, Summer 1971.   For
    a recent criticism of the Weisbrod-Hansen findings, see Joseph W.
    McGuire, 'The Distribution of Subsidy to Students in California Public
    Higher Education,' *Journal of Human Resources,*   Vol. 11, No. 3, Summer
    1976.

16 Judy, 'The Income-Redistributive Effects of Aid,' esp. Table 5, 313.

17 Some of the survey findings have recently been published.   See Secre-
    tary of State, *Some Characteristics of Post-Secondary-Students in
    Canada* (Ottawa, 1976).

sources were utilized: Statistics Canada's *Consumer Finance Survey of 1974* in the construction of education/earning profiles and the special survey conducted by the Ontario Ministry of Colleges and Universities in cooperation with Statistics Canada on the starting salaries of university graduates. These sources and the procedures are described below.

The Benefits of Human Capital Embodied in Male Graduates of the Class of 1974

As outlined above, economic benefits in this study are computed from the standpoint of the graduates' parents, who are classified into income groups on the basis of fathers' incomes. Since the investment decision (i.e. to go or not to go to university) was made in 1970, economic benefits realized over the entire lifetime of the graduates are cumulated and dis- counted back to 1970 present values. (This is also done with the costs of university education, as explained in the next chapter.)

The measurement of benefits in this study is partial rather than total. For example, no attempt is made to calculate 'externalities,' the indirect or third-party net gains (e.g. better citizenship) resulting from university education. While their importance has traditionally been recognized and used to justify public subsidization of uni- versities, they are extremely difficult to identify and quantify. There is little reason to believe that the net external benefits per graduate correspond to the father's income, so that their exclusion may not significantly bias the redistributive effects measured in this study.

Since the benefits are calculated for groups rather than for individual investors, they are in gross terms, before income tax. This procedure may be challenged on the ground that the group itself consists of private individuals, and any income realized would be subject to income tax at the appli- cable (progressively graduated) rate. However, it is not assumed that any income actually accrues to the groups of parents. Their children's additional lifetime income is merely a measurable yardstick of upward socioeconomic mobility brought about by the parents' investment in university education. When parents invest in a child's college education they are

motivated by expected upward mobility or higher lifetime income; there would be negligible anticipated costs of the extra income tax liability arising from their child's higher income status.

INCOME INTERVALS

Before the estimating methods are described, it is important to comment on the parental income classification employed. In the first place, income is according to the intervals used in the PSSS (less than $2,000; $2,000 - $4,000; $4,000 - $6,000; $6,000 - $10,000; $10,000 - $15,000; $15,000 - $20,000; $20,000 - $25,000; and $25,000 and over) because its respondents were asked to indicate simply their parents' income range rather than the exact amount. (Income was defined as 1974 income from all sources before taxes.) This procedure tends to overcome the problem of the indefinite knowledge responding students might have of their fathers' and mothers' incomes. However, it was not possible to obtain combined parents' incomes because the PSSS questionnaire requested fathers' and mothers' incomes separately, and since this was given within a stated range no addition could be performed. In any case, the mothers' income responses appeared to contain some additional problems. For example, about 55 per cent of the total 1974 male graduates reported zero mothers' income; this percentage was higher for certain specific subsets of students. Undoubtedly, zero mothers' income is often a valid response, especially in the case of such a survey as the PSSS. However, in many cases it may also reflect variable labour market experience of the female workers, a fact more frequently encountered among female than male workers. Consequently, it was decided to rely exclusively on fathers' income to classify the 1974 class of male graduates into the PSSS income groups.

The estimating procedure for calculating the economic benefits of university education for the various income groups is

$$B = \sum_{j=1}^{z} b_j = N_{ij} \sum_{t=0}^{n-4} \frac{Eu_i(1+yu)^{t+1}}{(1+r)^{t+1}} - \sum_{t=0}^{n} \frac{Eh(1+yh)^{t+1}}{(1+r)^{t+1}} , \qquad (1)$$

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where B is the total measured economic benefits of university
education in Ontario due to male graduates in 1974 of full-time
undergraduate courses; b_j is the share of the j-th income group
of B (j=1, ... z); N_{ij} is the cross-tabulation of graduates by
field of study (denoted by i) and income group (denoted by j);
Eu_i, Eh are first-year earnings of university graduates (of the
i-th field of study) and of high-school graduates (of academic
stream), respectively (note that the high-school graduates work
four more years than the university graduates); yu, yh are the
annual rates of progression of salaries of university and high-
school graduates respectively during their working life, t=0 to
t=n, where n is the retirement age; and r is the assumed
discount rate for computing present values.

The details of these calculations will be specified in the
context of statistical sources and methods employed.

PSSS DATA: COMPUTING N_{ij}

The extent to which various socioeconomic groups in
Ontario participate in and benefit from the university system
can only be determined on the basis of special tabulations of
enrolments and graduation data, cross-classified by the
socioeconomic origins of the student population - something not
regularly produced by educational statistical agencies.   In
recent years Statistics Canada has begun to collect such
information by means of special surveys of post-secondary
students in Canada.(1)   The survey data, while in many ways

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1   The first such survey, undertaken in 1968-9, was published by Statis-
tics Canada: *Post-Secondary Student Population 1968-69*, Cat. No. 81-543
Occasional, March 1970, (Ottawa).   The present study utilizes the data
obtained from a large-scale, Canada-wide survey of Post-Secondary
Students, undertaken in February 1975.   Although this survey produced a
large volume of data, covering several categories of students,
including graduate, part-time, and continuing education, I have used
only full-time, male, undergraduate students in Ontario universities.
See Table 1.

unique, is subject to the limitations normally associated with large mail surveys, such as high non-response, inaccuracy of replies, and sampling problems. To minimize these difficulties, we confined the study to full-time, male undergraduates in Ontario.(2) After a number of alternative tests of consistency of the PSSS tape, specially provided to the Ontario Economic Council by Statistics Canada, we obtained Table 1. This table is the result of the PSSS distribution of graduation data by father's income and field of study and the actual 1974 graduation data, provided on a preliminary basis by Statistics Canada in the absence of regular publication of this data.

Two important points about Table 1 deserve emphasis. First, it seems to support the general view that children of the well-to-do tend to concentrate in such high-paying fields of study as medicine, dentistry, and law.(3) There are few graduates in the health professions from income groups with less than $6,000. In engineering and applied sciences, mathematics and physical sciences, and social sciences, the lower-income groups' participation is higher, contrasting sharply with such fields as fine arts, humanities, arts, the pure sciences, and education, where presumably the consumption (i.e. psychic) effects of advanced education are relatively high. Secondly, while unequal access to higher-paying fields of study may not necessarily reflect systematic discrimination against lower-income groups, it does nevertheless suggest that universities in Ontario generate effects that alter income distribution. The exact manner of this redistributive effect

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2 Empirical studies of the economic value of females' education is exceedingly difficult partly because of conceptual problems of imputing dollar value to non-income activities and partly because of the lack of reliable data about the labour market participation of female graduates.

3 According to detailed PSSS data, the total enrolment share of low-income groups (i.e. under $6,000) were as follows: 2.8% in law (excl. pre-law), 9.1% in medicine (excl. pre-medicine), and 3.4% in dentistry (excl. pre-dentistry). By contrast, the respective shares of the top income groups (i.e. in excess of $20,000) were 54.3% in law, 26.3% in medicine, and 20.1% in dentistry.

TABLE 1: Distribution of 1974 Ontario graduates by father's income and field of study

Income groups / Field of study	Less than $2,000	$2,000 - 4,000	$4,000 - 6,000	$6,000 - 10,000	$10,000 - 15,000	$15,000 - 20,000	$20,000 - 25,000	$25,000 & over	Row Total
Education	0	0	136	453	591	289	128	242	1839
R	0.0	0.0	7.4	24.7	32.1	15.7	7.0	13.2	10.50
C	0.0	0.0	18.8	12.8	9.9	11.6	7.4	10.8	
Fine, applied, and perform. arts	0	0	0	132	127	34	0	77	370
R	0.0	0.0	0.0	35.7	34.3	9.2	0.0	20.8	2.11
C	0.0	0.0	0.0	3.7	2.1	1.4	0.0	3.4	
Humanities	0	0	40	612	675	61	42	505	1935
R	0.0	0.0	2.1	31.6	34.9	3.2	2.2	26.1	11.05
C	0.0	0.0	5.3	17.3	11.3	2.4	2.4	22.5	
Social sciences	118	174	161	862	1768	955	999	825	5862
R	2.0	3.0	2.7	14.7	30.2	16.3	17.0	14.1	33.48
C	41.8	32.8	22.2	24.4	29.6	38.3	57.6	36.8	

TABLE 1 (Cont'd)

Income groups / Field of study	Less than $2,000	$2,000 - 4,000	$4,000 - 6,000	$6,000 - 10,000	$10,000 - 15,000	$15,000 - 20,000	$20,000 - 25,000	$25,000 & over	Row Total
Agric. and bio. sciences	32	159	50	24	294	149	91	113	903
R	3.5	17.6	5.5	2.7	32.6	15.5	10.1	12.5	
C	11.3	29.9	6.9	0.7	4.9	5.6	5.2	5.0	5.16
Engin. and applied sciences	112	110	149	205	550	318	364	87	1895
R	5.9	5.8	7.9	10.8	29.0	16.8	19.2	4.6	
C	39.7	20.7	20.6	5.8	9.2	12.8	21.0	3.9	10.82
Health professions	0	48	0	127	249	61	91	170	791
R	0.0	6.1	0.0	16.1	37.2	7.7	11.5	21.5	
C	0.0	9.0	0.0	3.6	4.9	2.4	5.2	7.6	4.52
Mathematics and phys. sciences	20	40	189	206	572	86	20	85	1218
R	1.6	3.3	15.5	16.9	47.0	7.1	1.6	7.0	
C	7.1	7.5	26.1	5.8	9.6	3.5	1.2	3.8	6.95

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TABLE 1 (Cont'd)

Income groups Field of study	Less than $2,000	$2,000 - 4,000	$4,000 - 6,000	$6,000 - 10,000	$10,000 - 15,000	$15,000 - 20,000	$20,000 - 25,000	$25,000 & over	Row Total
Other specialities (Gen. arts and sciences)	0	0	0	916	1094	548	0	139	2697
R	0.0	0.0	0.0	34.0	40.6	20.3	0.0	5.2	
C	0.0	0.0	0.0	25.9	18.3	22.0	0.0	6.2	15.40
Row Total	282	531	725	3537	5965	2492	1735	2243	17510
%	1.61	3.03	4.14	20.20	34.07	14.23	9.91	12.81	100.0

NOTE: R is row percentage; C is column percentage

SOURCES: Statcan 1975 Post Secondary Students Survey; Statcan 1974 Graduates Data (Preliminary)

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can only be captured and quantified through disaggregation of enrolments and graduations by specific fields of study, something not done in previous studies.(4)

ESTIMATING LIFETIME EARNINGS: Eu_i, Eh, Yu, and Yh

Since actual lifetime earnings data are not available, a proxy from cross-sectional sample data had to be used in the construction of education/earning profiles. The sample of 1974 Survey of Consumer Finances (incomes of 1973) from Statistics Canada are used for estimates in this study.(5) The education/ earning profiles are derived from the basic relationship $Y_e = f_e(A)$, indicating that the earnings of a given set of workers, with a given educational attaintment e (e = university or high school) is a function of age A. This, of course, is a key assumption of the human capital theory, and it has been widely demonstrated through empirical applications, including the present one.

Different specifications of the basic relationship were tested; the best fit – the one having the highest R^2 – was found to be a second-degree polynomial. In the case of male university graduates in Ontario, the following equation was obtained.(6)

$$Yu = -36.371 + 2.50A - 0.027A^2, \qquad R^2 = 0.84. \qquad (2)$$
$$ (0.18) \quad (0.0022)$$

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4   Aggregate studies cannot reflect occupational earning differentials. Doing this, however, entails some arbitrary links between fields of study at the university and the occupations into which the graduates are placed. This is explained in the appendix.

5   The data refer to earnings of heads of census families and persons not in families obtained from micro data file income 1973 (census families).

6   The log-linear equation was

$$Yu = -155.68 + 62.47 \ lnA - 1.41A, \qquad R^2 = 0.75.$$
$$ (7.14) \qquad (0.20)$$

For the high school (academic stream) graduates, the following estimating equation was obtained[7]:

$$Yh = 15.917 + 1.32A - 0.015A^2, \quad R^2 = 0.73. \qquad (3)$$
$$ (0.13) \quad (0.0015)$$

By differentiating equations (2) and (3), we obtained the growth of income at each age y. These computed growth rates were then applied to independent initial income - first-year earnings following graduation - denoted by Eu. The source of data for Eu is the special survey conducted jointly by the Ontario Ministry of Colleges and Universities and by Statistics Canada. This source, among other things, produced earnings data for some sixteen thousand 1974 graduates over an eighteen-month follow-up period. Since the initial income Eu depends on the type of university education received, it was postulated that the earnings at any point in time K^t are determined by Eu and by the growth rate yu^t, that is, $K^t = F(Eu, yu^t)$. Therefore, we can construct a lifetime earnings stream for graduates from different university courses of study through to retirement at t=n, and convert the cumulated lifetime earnings to present value at discount rate r:

$$PV(Yu)_i = \sum_{t=0}^{n-4} Eu_i(1 + yu)^{t+1}/(1 + r)^{t+1}, \qquad (4)$$

and similarly for the high school graduates who work four more years:

$$PV(Yh) = \sum_{t=0}^{n} Eh(1 + yh)^{t+1}/(1 + r)^{t+1}. \qquad (5)$$

Note that in the case of high school graduates there is no differentiation with respect to field of study, this being our control group.

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7   The log-linear equation was

$$Yh = -95.09 + 39.75 \ln A - 0.96A, \quad R^2 = 0.79.$$
$$ (3.47) \quad (0.097)$$

The expressions on the right-hand side of (4) and (5) have been incorporated in equation (1). It should be noted that equations (4) and (5) manifest the same (i.e. average) growth rates for different occupations which have different initial salaries – a procedure dictated by lack of detailed data.

Since the class of 1974 male graduates entered university in 1970, we have to calculate the economic benefits which they and their parents could rationally expect at that time. That is to say, we assume that the joint investment decision (to go to university) was taken in 1970 – a perfectly plausible assumption. The practical implication of this assumption is that the additional lifetime earnings to be realized by the university graduates following graduation in 1974 must be cumulated and discounted back to 1970 (as with costs, discussed in the next chapter). In terms of equations (4) and (5), the actual 1974 starting salaries are discounted back to 1970 and the relevant growth rates then applied accordingly.

The results of these computations are tabulated in Tables A1 to A5, each for a different rate of discount ranging from a low of 8 per cent to a high of 12. This was done in order to show the impact on our results of alternative discount rates. The last row in each table indicates the present value of additional lifetime earnings accruing to the graduates of a given income group aggregated for nine fields of study; the second last row indicates the same for high school graduates, which is used for deriving the net amounts shown in the last row.

Table 2 summarizes measured economic benefits of the various income groups. The first column values (i.e. at 8 per cent) will form the basis of comparisons with the cost data below.

Before estimating costs, it is important to note that a number of simplifying assumptions were made during our calcu-lations. These are described in the appendix.

TABLE 2: Present value of expected additional (net) lifetime earnings of male Ontario university graduates in 1974 by father's income and different rates of discount

Income group	Discount rate ($000)				
	8	9	10	11	12
Under $2,000	20,630	17,077	14,504	12,411	11,046
$ 2,000 - 4,000	39,564	33,375	28,389	24,331	21,517
$ 4,000 - 6,000	51,339	43,230	36,703	31,392	27,517
$ 6,000 - 10,000	254,047	214,045	181,831	155,624	136,689
$10,000 - 15,000	430,878	362,967	308,417	264,034	232,885
$15,000 - 20,000	179,035	150,836	128,130	109,657	97,351
$20,000 - 25,000	123,840	104,329	88,618	75,835	68,338
$25,000 and over	159,676	134,522	114,267	97,789	86,733
TOTAL	1,259,009	1,060,381	900,859	771,073	682,076

NOTE: Discounted 1970 values

SOURCE: Tables A-1 to A-5

Allocating the Cost of Producing the Class-of-1974 Male Graduates by Income Groups

It is necessary to clarify the concept of cost used in this study. Theoretically we wish to apply the principle of 'user cost' to the production of class-of-1974 male graduates, the user of universities in this case being the parents of the graduates. If university education in Ontario were supplied and priced entirely as a 'private service,' the fee levels might reflect the full cost of the service. The practical and political objections to such a system are obvious. At the other extreme, conceivably, there might be a specific 'university tax,' based on certain principles of equity and efficiency, in order to finance university education completely as a publicly supported service. In Ontario, of course, the situation is somewhere between these two extremes, closer to the second than to the first option. While university education entails certain private costs (e.g. for books, living, and accommodation as well as pocket money), by far the largest component of annual per-student costs are public tax revenues, raised through federal, provincial, and municipal taxation. In 1973-4, resources made available through provincial and federal grants to post-secondary education in Ontario accounted for about 70 per cent and 10 per cent respectively of the total provincial expenditures. Private tuition fees accounted for 12 per cent, and the remaining 8 per cent came from other sources, mainly endowment income.(1)

We are interested in determining university costs of class-of-1974 male graduates from the standpoint of parents who are also taxpayers. In addition, we shall include private

1   Statistics Canada, *Financial Statistics of Education* (81-208, Annual), Table 43, 150. These percentages, derived from a legalistic interpretation, understate the actual federal cost share.

tuition fees and funds raised from other sources as mentioned above. Since we are not calculating benefits and costs for private university students, their forgone earnings while studying are excluded. Also excluded are the students' living expenses which would have been incurred anyway.

Ontario does not have a specific 'university education tax.' Public funds for universities originate in a wide range of federal, provincial, and municipal taxes on individuals, corporations, and property, levied directly and indirectly. This situation leads to the problems of fiscal incidence and tax shift arising from the fact that there are important variations in tax burden and subsidy benefit for the various income groups of taxpayers. For example, how can one allocate those corporate income taxes utilized to finance universities among various income groups? Relying only on income tax to determine tax burden by income groups would be highly unsatisfactory, since taxation is known to be the most progressive form of tax and since it is readily agreed that all forms of education in the province (as in Canada) are financed from other forms of public revenue as well.

The following operational assumption has been adopted: the tax burden of specific income groups in university financing is proportional to their over-all tax shares. In other words, the percentage share of each income group of the total tax revenues from all sources, could be used to allocate the given cost of university education represented by a sample of students. This assumption of proportionality is central to this chapter.(2)

The problem of tax shift requires adjustments and recalculations of various forms of tax revenues to convert them to a common classification of individual taxpayers. In this study the groups are the parents of 1974 male graduates, classified according to income. Such a conversion involves many arbitrary assumptions, for example regarding the extent to which taxes on

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2   This procedure is a standard assumption. See, for example, Hansen and Weisbrod, *Benefits, Costs and Finance of Higher Education.*

corporations can be shifted to individuals, consumers, or other groups. Such a task would clearly be beyond the scope of this study, which uses instead the work of David Dodge on the year 1970, the latest such data available.[3] On the basis of certain tax-shift assumptions, Dodge was able to determine the total tax revenues from all sources for 1970 subdivided into the shares of specific family income groups. His total tax shares are utilized in this study, as explained below. Some weaknesses inherent in his study bias our results, and these will be discussed as well.

THE COST COMPONENTS

The general formula for our cost estimates is as follows:

$$TC = \sum_{j=1}^{z} c_j = p_j \sum_{t=0}^{4} \frac{\lambda_t(R_t+0.02K_t+G_t+S_t)}{(1+r)^{t+1}} + e_j \sum_{t=0}^{4} \frac{\lambda_t H_t}{(1+r)^{t+1}} \tag{6}$$

$$- a_j \sum_{t=0}^{4} \frac{\lambda_t S_t}{(1+r)^{t+1}} \, ,$$

where TC is the total public cost of producing 1974 male graduates (in present value); c_j is the cost share of the j-th income group ($j=1, \ldots z$); p_j is the total tax share of the j-th income group in 1970 as computed by David Dodge; λ_t is the proportion of male undergraduates of total university enrolment, (estimated at about 55 per cent); R_t are the operating costs over the four-year academic program (excluding fees); $0.02K_t$ is one-fiftieth of the capital expenditures over the four-year academic program; G_t are the administrative and overhead expenditures over the four-year academic program excluding fees); S_t is student aid, of all types and from

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3   David Dodge, 'Impact of Tax Transfer and Expenditure Policies of Government on the Distribution of Personal Income in Canada,' *Review of Income and Wealth*, Series 21, No. 1, March 1975.

federal and Ontario sources, during the four-year academic program; e_j is the graduation share of the j-th income group; H_t are the fees paid by the 1974 graduating class during the four-year academic program; and a_j is the student aid share of the j-th income class as determined from the PSSS tape.(4) The data sources for the various costs are indicated on Tables 3 to 5.

This formula reflects the fact that the total cost of producing university graduates in Ontario can be subdivided into (1) operating expenditures, (2) capital expenditures, (3) tuition fees, and (4) other expenditures, principally student assistance funds. Expenditures cover only undergraduate programs, and are prorated for the male 1974 class by means of the parameter λ_t. In allocating these costs to various income groups there are important differences in expenditure burdens. While some university expenditures are invariant with respect to income, others are not. For example, operating and capital expenditures as well as administrative overhead costs are independent of student demand for university places, although the public support system is based on enrolments. Oh the other hand fees are directly linked to student demand as reflected by enrolments, and student aid is determined partly by enrolment and partly by students, financial aid.

The cost calculations reflect these differences, as the general equation (6) above illustrates. Thus operating, capital, and overhead expenditures (including student aid) have been allocated between income groups in proportion to their respective tax shares, as computed by Dodge for 1970 (see Table 3c). Unfortunately, Dodge's income groupings stop at $15,000,

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4   See Table A-7. It may be useful to compare these shares with the following data recently provided to us from the Ministry of Colleges and Universities relating to 1976-7 recipients of OSAP and CSL funds (K = $1000):

Parental income	<$2K	$2K-$4K	$4K-$6K	$6K-$10K	$10K-$15K	<$15K
No. of recipients	1,949	2,700	3,573	10,132	14,896	9,623
Percentage	4.5	6.2	8.3	23.6	34.7	22.5

Parental income	Total
No. of recipients	42,873
Percentage	100.0

lumping all higher incomes together, as did Gillespie's similar study for 1969.(5)

In the case of capital expenditures, capitalization and long-term depreciation have been allowed for by imputing only 1/50th of the annual expenditures during our reference period, i.e. 1970-1 to 1973-4.(6) (see Table 3). Student aid has been

TABLE 3A: Budgetary costs in aid of Ontario universities, 1970-1 to 1973-4 ($ million)

Year	Operating expenditures+ (1)	Fees (2)	Capital* Total (3)	1/50 (4)	Other** (5)	Total Costs (1)+(4)+(5)
1970-1	451	77	196	4	72	527
1971-2	493	108	142	3	65	561
1972-3	510	102	112	2	62	574
1973-4	558	110	119	2	74	634

Source: Table 40, Statistics Canada: *Financial Statistics of Education*, 81-208 (Annual).

+ : From federal, provincial, and municipal source, excluding fees

* : From federal, provincial, and municipal source, excluding fees

** : From federal, provincial, and municipal source, including student aid.

5 W.I. Gillespie, 'On the Redistribution of Income in Canada,' *Canadian Tax Journal*, Vol. 24, No. 4, July-August 1976.

6 This period was one of declining capital expenditures and therefore may not be representative. However, the allowable share of capital expenditures in our calculations is too small to make any significant difference.

TABLE 3B: Discounted value of budgetary costs in aid of the male graduates of the class of 1974

Year	Total	male	Share of UNDERFUL	students	Discounted 1970 values at the following rates				
					8%	9%	10%	11%	12%
1970-1	527	.556		293	293	293	293	293	293
1971-2	561	.554		311	288	285	283	180	278
1972-3	574	.537		308	264	259	255	250	246
1973-4	634	.537		340	270	263	255	249	242
Total					1,115	1,100	1,086	1,072	1,059

NOTE: UNDERFUL means full-time undergraduate students. The enrolment shares are calculated from Statistics Canada, *Education in Canada, 1975*, 81-229 (Annual), Tables 36 and 37.

TABLE 3C: Distribution of budgetary costs by income groups

Income group	Tax share	Discounted 1970 values at				
		8%	9%	10%	11%	12%
Under $2,000	1.7	19.0	18.7	18.5	18.2	18.0
$ 2,000 - $ 4,000	4.6	51.3	50.6	50.0	49.3	48.7
$ 4,000 - $ 6,000	7.4	82.5	81.4	80.4	79.3	78.4
$ 6,000 - $10,000	24.6	274.3	270.6	267.2	263.7	260.5
$10,000 - $15,000	27.8	310.0	305.8	301.9	298.0	294.4
$15,000 - $20,000						
$20,000 - $25,000	33.9	378.0	372.9	368.2	363.4	359.0
$25,000 or over						
TOTAL	100.0	1,115	1,100	1,086	1,072	1,059

NOTE: Tax share is Dodge's data, from Table A-6.

included in this category to accommodate the associated tax shift, the fact that the burden of tax differs from the expenditure benefit for given income groups; subsequently student aid is netted out, as shown in Table 6. The shares of income groups with respect to fees paid by class-of-1974 male graduates during their university years have been derived from the distribution of graduates as shown in Table 4. The source of

TABLE 4A: Allocation of fees, 1970-1 to 1973-4 ($ million)

Year	Total ($ million)	Share of male UNDERFUL students		Discounted 1970 values at 8%	9%	10%	11%	12%
1970-1	77	.556%	43	43	43	43	43	43
1971-2	108	.554%	60	56	55	55	54	54
1972-3	102	.537%	55	47	46	45	44	44
1973-4	110	.537%	59	47	46	44	43	42
TOTAL				193	190	187	185	183

SOURCE: Table 3

TABLE 4B: Allocation of fees, 1970-1 to 1973-4 by income group ($ million)

Income group	Share of 1974 male graduates		Allocation of fees at 8%	9%	10%	11%	12%
Under $2,000	1.6		3.1	3.0	3.0	3.0	2.9
$ 2,000 - $ 4,000	3.0		5.8	5.7	5.6	5.6	5.5
$ 4,000 - $ 6,000	4.1		7.9	7.8	7.7	7.6	7.5
$ 6,000 - $10,000	20.2		39.0	38.4	37.8	37.4	37.0
$10,000 - $15,000	34.1		65.8	64.8	63.8	63.1	62.4
$15,000 - $20,000	14.2 ⎫						
$20,000 - $25,000	9.9 ⎬ 36.9		71.2	70.1	69.0	68.3	67.5
$25,000 or over	12.8 ⎭						
TOTAL	100		193	190	187	185	183

SOURCE: Table 1

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this distribution is the PSSS data tabulated in Table 1. Finally, student aid shares, from the Ontario Student Aid Plan (OSAP) and the Canada Student Loan Plan (CSLP), were computed on the basis of data obtained from the 1974-5 PSSS tape; these calculations are shown in Table 5.

TABLE 5A: Allocation of student aid 1970-1 to 1973-4 ($ million)

| Year | Total | Discounted 1970 values at | | | | |
		8%	9%	10%	11%	12%
1970-1	66.2	66.2	66.2	66.2	66.2	66.2
1971-2	61.7	57.1	56.6	56.1	55.6	55.1
1972-3	52.4	44.9	44.1	43.3	42.5	41.8
1973-4	63.3	50.2	48.9	47.6	46.3	45.1
Share of full-time male undergraduates						
1970-1	.556	36.8	36.8	36.8	36.8	36.8
1971-2	.554	35.6	31.4	31.1	30.8	30.5
1972-3	.537	24.1	23.7	23.3	22.8	22.4
1973-4	.537	27.0	26.3	25.6	24.9	24.2
TOTAL		119.5	118.2	116.8	115.3	113.9

NOTE: Total includes scholarships, bursaries and cost of loans to students, from federal and provincial aid programs.

TABLE 5B: Allocation of student aid, 1970-1 to 1973-4
by income group

Income group	Student aid share in 1974-5		Discounted rate				
			8%	9%	10%	11%	12%
Under $2,000	4.7		5.6	5.6	5.5	5.4	5.4
$ 2,000 - $ 4,000	5.1		6.1	6.0	6.0	5.9	5.8
$ 4,000 - $ 6,000	13.2		15.8	15.6	15.4	15.2	15.0
$ 6,000 - $10,000	20.0		23.9	23.6	23.4	23.1	22.8
$10,000 - $15,000	29.2		34.9	34.5	34.1	33.7	33.8
$15,000 - $20,000	15.6						
$20,000 - $25,000	5.8	27.8	33.2	32.9	32.5	32.1	31.7
$25,000 and over	6.4						
TOTAL	100.0		120	118	117	115	114

Student aid share from PSSS tape - Table A7
SOURCE: Table 3a

Table 6 summarizes the resources used to produce the
class-of-1974 male graduates evaluated in this study.   The
computational procedures behind these figures, indicated at the
bottom of the table, are fully consistent with the description
outlined above.   All costs are in terms of discounted 1970
values.

TABLE 6A: Total costs of class of 1974 male graduates
net of student aid ($ million)

Year	Discounted 1970 values at				
	8%	9%	10%	11%	12%
1970-1	299.2	299.2	299.2	299.2	299.2
1971-2	312.4	308.6	306.9	303.2	301.5
1972-3	286.9	281.3	276.7	272.2	267.6
1973-4	290.0	282.7	273.4	267.1	259.8
TOTAL	1189	1172	1156	1142	1128

NOTE: Amounts = columns in Table 3b plus columns in Table 4a
minus columns in Table 5a.

TABLE 6B: Distribution of total (net) costs by income groups

| | Discounted 1970 values at | | | | |
Year	8%	9%	10%	11%	12%
Under $2,000	16.5	16.1	16.0	15.8	15.5
$ 2,000 - $ 4,000	51.0	50.3	49.6	49.0	48.4
$ 4,000 - $ 6,000	74.6	73.6	72.7	71.7	70.9
$ 6,000 - $10,000	289.4	285.4	281.6	278.0	274.7
$10,000 - $15,000	340.9	336.1	331.6	327.4	323.5
$15,000 and over	416.0	410.1	404.7	399.6	394.8
TOTAL	1189	1172	1156	1142	1128

NOTE: Amounts = columns in Table 3a plus columns in Table 4b
       minus columns in Table 5b.

Chapter 4
Benefit-Cost Ratios by Income Groups

The principal findings of this study are summarized in Table 7 using an 8 per cent discount rate and expressing economic benefits and costs of producing the class-of-1974 male graduates in 1970 values. Column (1) shows the measured benefits and column (2) the costs, by parental income groups. Column (3) gives the actual benefit-cost ratios for each income group. These may be interpreted as the average return per dollar of cost for the given income groups. Column (4) presents the standardized benefit-cost ratios relative to the aggregate ratio of 1.06. This column, containing the major results of this study, shows the relative impact of universities in Ontario on the income position of each group, assuming that the over-all (i.e. sectoral) effect of the universities on income distribution was neutral. The resulting

TABLE 7: Benefit-cost ratios by income groups ($ million)

Income groups	Monetary benefits (1)	Net budgetary cost (2)	Benefit cost ratios	
			Actual (3)	Standardized (4)
Under $2,000	20.6	16.5	1.25	1.18
$ 2,000 - 4,000	39.6	51.0	.78	.74
$ 4,000 - 6,000	51.3	74.6	.69	.65
$ 6,000 - 10,000	254.0	289.4	.88	.83
$10,000 - 15,000	430.9	340.9	1.26	1.19
$15,000 and over	462.6	416.0	1.11	1.05
TOTAL	1,259.0	1,188.4	1.06	1.00

NOTE: Monetary benefits from Table 2; Net budgetary cost from Table 6b.

deviations from unity are indexes of the income-redistributive effects of university education for the sample of students studied.

The aggregate ratio of 1.06 implies that the total cumulated investment outlay used up in the production of the 1974 class of male graduates, was a moderately worthwhile undertaking, considering all the income groups together. This, however, is not the central objective of the present study. Rather our main interest is the income-redistributive effects of universities, but before taking up this issue certain important observations on column (3) must be made.

- The lowest-income group (i.e. less than $2,000) has a ratio of 1.25, implying that the group's share of university expenditures are more than returned as a result of their childrens' use of universities to realize additional lifetime earnings or, put differently, to achieve upward socioeconomic mobility. While this is a clear evidence of progressive effect, it is actually a marginal result since the numbers of graduates from this income group are relatively few.

- The next income groups (i.e. those in the $2,000 - 10,000 bracket) fail significantly in recouping their share of university cost. In fact, the $4,000 - $6,000 group recovered only 69 cents per dollar of cost. This highly regressive effect represents the converse of the relative gains achieved by other income groups.

- What might be considered the middle-income group (i.e. those in the $10,000 - 15,000 bracket) had the highest benefit-cost ratio of any single group, 1.26.

- The top income group, making in excess of $15,000, had an average ratio of 1.11. Unfortunately, because of the limitations in Dodge's income grouping noted above, it is not feasible to use a finer income breakdown, although it might be safe to state that the ratio would not decline as the level of income increased beyond $15,000.

Although these results are interesting by themselves, they do not tell us about the redistributive effects of the supply and financing of university education in Ontario. This is done in column (4), where the benefit-cost ratios are standardized on the basis of the aggregate ratio of 1.06. If university education had a neutral redistributive effect (i.e. left all taxpayers in the same position), their standardized ratios would be equal to 1; those made better off would have a ratio greater than unity, while those made worse off would have a ratio less than 1.

From column (4) it is clear that the lower income groups (i.e. $2,000 - 6,000) were made worse off, while the middle income group ($10,000 - 15,000) appeared to have made the largest relative gain from the class of 1974 graduates. The top income group was also relatively better off, as was the bottom with the lowest income group. This last group's performance, however, indicates, not a strong pro-poor redistributive effect of the university education, but rather the strong pro-poor tax structure at the lowest levels of gross income. This is because the number of children attending and graduating from universities from the $0 - $2,000 group is statistically too small to be significant (see Table 1).

The results contained in column (4) are quite invariant to differences in the discount rates. The use of alternative rates ranging from 8 to 12 per cent produced only negligible changes in the standardized benefit-cost ratios.

The regressive redistributive effects of university education in Ontario reported here are minimal estimates because a relatively low 8 per cent discount rate is used and applied equally to every income group. In fact, there are good grounds for using a higher discount rate for the lower income groups to reflect their comparatively disadvantageous access to capital markets, discriminatory treatment in labour markets of sons lacking influential connections, and higher rates of time-preference of poor parents.

The existing pattern of university education in Ontario strongly favours the rich and subsidizes the middle- and high-income groups at the expense of the lower-income groups.

LIMITATIONS OF RESULTS

The results are biased by data limitations. However, these biases tend to offset each other, some understating and others overstating measured regressivity. One thing is quite clear: the results are derived from the experience of only one graduating class, that of 1974. Further research covering other years would ensure greater reliability. In addition, the possibility of economic returns to university dropouts was excluded. Strictly speaking, this may not be valid, and to the degree that the dropout rate varies with respect to parental income and university dropouts experience higher earnings than high school graduates the results understate the degree of regressivity. Unfortunately there are no satisfactory data on dropouts to allow further investigation.

Another bias arises from excluding the effect of ability on earning differentials. While this tends to overstate the absolute net benefits of university education for all income classes, it would not affect the over-all results unless the distribution of ability varied with the level of parental income. Such evidence has not been found for Ontario.

Finally, measured benefits for income groups are derived from fathers' incomes, as reported by the students in the PSSS sample, whereas costs were allocated using Dodge's family income classification. Since the difference between father's income and family income can be expected to decrease with income, our estimates tend to overstate benefits for the lower-income groups, thus understating regressivity.

On balance, these biases are unlikely to alter the over-all result that the net incidence patterns of Ontario universities is highly regressive. The present findings raise serious questions about the equity and effectiveness of higher education policies in Ontario, especially as regards the present administration and distribution of student aid funds under the OSAP and CSLP programs.

Chapter 5
A Cross-Sectional Analysis of Student Aid Programs, 1974

A principal policy instrument in Ontario and Canada for promoting equality of opportunity in higher education is financial assistance to students provided under a variety of grant and loan schemes offered by the federal and provincial governments. To the extent that these schemes are progressively administered they could remove, or at least lessen, financial impediments for the accessibility of low-income students seeking university places. On the other hand if they tend heavily to favour students from well-to-do-families, they would merely preserve a system of unequal access to university. This is an empirical question, and one that may provide useful information on an important policy instrument (i.e. student aid schemes) directly bearing on the redistributive process of higher education.

Accordingly, this chapter evaluates the workings of the existing federal and provincial aid programs, the Canada Student Loan Programme (CSLP) and the provincial Ontario Student Assistance Plan (OSAP). The basis of this evaluation is a cross-sectional multiple regression model constructed from the 1975 PSSS Tape data. The basic regression equation is:

$$SA = C + \sum_{k=1}^{29} \alpha_k X_k + \sum_{f=1}^{3} \beta_f X_f + U_z \ ,$$

where SA is the amount of scholarship and loan assistance received by Ontario university students (male and female) in the academic year 1974; X_k are dummy variables (twenty-nine in all) classified into fifteen groups and defined in Table A-10; X_f are continuous variables (three in all): age of the student, income of the father, and income of the mother, defined in Table A-10; α_k, β_f are coefficients of regression; C is the intercept term; and U_z is a random term with the usual assumptions of the ordinary least squares: $E(U_z) = 0$ and $E(U_z^2) = \sigma_z^2$.

The dependent variable SA is the amount of funds received by full-time undergraduate students in Ontario universities under loan and scholarship schemes; on the other hand we have identified a total of thirty-two socioeconomic independent variables, including age, sex, and marital status of the student, father's and mother's education and income levels, size of family, language spoken at home, distance to university, summer employment, borrowing experience, etc. The selection of these variables was determined primarily by the PSSS data.

The complete results are tabulated in Tables A-8 and A-9 scholarships and loans respectively. The variables are defined in Table A-10.

Table 8 contains statistically significant results for scholarship funds and for loans. In the case of the former, being married (as opposed to being single) implies an extra $444.41; and additional year's seniority generates $56.24 more scholarship funds; children of working or labouring fathers get $835.23 more than the children of professional fathers; and students who did not work during the summer received $214.34 more relative to those who worked longer than three weeks. Students who did not borrow under the student aid scheme were disadvantaged as compared with those who previously borrowed by as much as $190.15. Finally, there appears to be a relatively mild, negative correlation between father's income and scholarship, with each additional $1000 associated with a $17.04 reduction in grant money.

In the case of repayable loans the most important single variable is the status of the student as a borrower: being a previous borrower implies $588.49 more compared to a non-borrower. For every $1000 additional income of father's income, the student receives $10.10 less loan funds, while students who did not work during summer get $128.63 more in loans than those who worked. Being married - a variable not as strongly significant as in the case of scholarship funds - implies an extra $80.18, and, unlike scholarships, sex plays a significant marginal impact, with females receiving $48.65 more than male students.

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TABLE 8: Measured marginal effects of statistically significant socioeconomic variables on loans and scholarships received by Ontario university students under the federal and provincial student aid programs, 1974

Variable	Description	Dummy	Coefficient($)	t-statistic (at 1% level)
Scholarships				
MARO1	Married	Single	+444.41	8.68
AGE	Age	*(mean=20.9 yrs.)	+ 56.24	8.36
INCF	Fathers income	*(mean=$13,9000)	- 17.04	7.64
BORO1	Students who did not borrow	student who borrowed	-190.15	6.30
OCCFO4	Father as workman or labourer	Professional	+835.23	5.32
SUMO2	Students who did not work during summer	Students who who worked more than 3 weeks	+214.34	3.77
R^2 = 0.28	No. of observations = 1733			
Loans				
BORO1	see above	see above	-588.49	35.72
INCF	see above	*(mean=$14,500)	- 10.10	8.28
SUMO2	see above	see above	+128.63	4.15
SEXO1	Female	Male	+ 48.65	3.22
MARO1	see above	see above	+ 80.18	2.86
R^2 = 0.60	No. of observations = 1,600			

* Continuous variable, Source: Tables A-8 and A-9.

Over-all, these results imply that financial considerations are highly important in the allocation of aid funds amongst Ontario University students. Indeed, the present results indicate that financial factors tend to overpower other socioeconomic and cultural variables included in the regression model.

Additionally, the following implications deserve emphasis. While there is a mild progressive (i.e. negative) correlation between father's income level and the amount of student aid received, the present system appears to favour students who, for whatever reason, do not work during the summer and who tend to repeat borrowing public funds to finance their studies. Coupled with the fact that much of the student aid funds are received by students from middle- and higher-income groups, these findings leave one wondering about the equity effects of existing student aid programs.

Chapter 6
Some Implications

With results derived from a single class of male graduates, it is risky to attempt inferences. Policy recommendations would have to be based on more extensive research findings. The present study is a first exploration in Canada of the equity aspects of higher-education, an important area of public policy that has generally been neglected. Given the increasing public concern about the equity problems in university education planning and policy, more studies of the income distributive effects of universities would be highly desirable. Meanwhile the following implications of the present study deserve high-lighting.

UNEQUAL ACCESSIBILITY

The lower-income groups' share of total graduations as well as of graduations in certain fields of study (e.g. law, dentistry, and medicine) are quite low, suggesting that both ex-ante and ex-post equity in the universities of Ontario is deficient. There is little justification for believing that Ontario is a land of opportunity so far as university education is concerned. Furthermore, the student aid programs now available need reform to provide wider accessibility. What is particularly embarrassing is that the expansionary policy targets of the 1960s have evidently failed to equalize access and opportunity for the lower-income groups.

The causes of unequal access for lower socioeconomic groups in the Ontario society are complex. While some are cultural or sociological,(1) others are clearly financial and

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1   Paul Anisef, *The Critical Juncture* (Ontario Ministry of Colleges and Universities, 1976); John Buttrick, *Who Goes to University from Toronto*? (Ontario Economic Council, 1977)

economic. So long as the public schemes intended to offer financial assistance to potential students from poor families remain inadequate, it is impossible to claim that unequal accessibility is not linked to insufficiency of family income. Thus, it is hardly convincing to argue that poor families have no, or little, interest in university education and appear to be indifferent to existing financial assistance schemes, when these schemes tend to be administered in favour of the children of the rich and suffer from serious inherent weaknesses.

ADEQUACY AND EFFECTIVENESS OF STUDENT AID

At the present time student aid funds under OSAP and CSLP are conditional upon admission to university. Potential university students, for example from poor families, may or may not be encouraged to proceed to university by these schemes. If aid funds were made available *before* admission to university, as a result of fuller publicity among high school students (but actually provided *after* admission), there might be a higher flow of lower-income children from high school to university.

There is evidence to indicate, however, that the critical point in high school is grade 9, when students have to decide whether to enter the academic stream or the technical and vocational stream.(2) This would suggest that the way to increase lower-income participation in university is through special measures directed at this stage of the high-school programs. There is also considerable room for more effective publicity of student aid programs.(3) The Ontario Economic Council's 1976 Education position suggested that financial assistance from the provincial sources might be extended to

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2 Edmund Clark, David Cook, George Fallis, 'Socialization, Family Background and the Secondary School,' in Robert M. Pike and Elia Zureik, eds, *Socialization and Values in Canadian Society*, Vol. 2 (Toronto: McClelland and Stewart, 1975)

3 Martynas A. Ycas, 'The Educational Plans of Senior Secondary Students,' Ontario Department of the Secretary of State, March 1976

low-income families of 'the talented child who might drop out between grades seven and eleven, as soon as he reaches the legal school-leaving age because [he or she has] not been led to expect to proceed to higher levels or because the family needs the money the boy or girl can earn.'(4)

In addition to financial constraints, university access is evidently a function of sociological and cultural factors, but much research is needed to identify and evaluate the relative impact of these non-financial constraints.

If the current pattern of enrolment in university were socially acceptable, student aid funds under the existing programs would appear to be progressively allocated. For example, comparing graduation shares with student aid shares, we see that the lower-income groups receive more aid than their graduation share, and conversely for higher-income groups. However, the participation rate of lower-income groups in terms of enrolments and graduations is only a small fraction of their population share.(5) Special measures would be needed to offset this under-representation.

INCOME-REDISTRIBUTION EFFECTS

This study finds strong evidence that the Ontario university system as presently financed and supplied is quite regressive. Although at the lowest income level it appears to be progressive, the number of graduates is too small to be significant. The principal net gainers from the university system are the middle- and upper-income groups at the expense of the lower-income groups. In this sense the university system is a large public expenditure program in which the relatively poor groups tend to subsidize the relatively rich.

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4   The Ontario Economic Council's position paper on *Education: Issues and Alternatives 1976*, 14

5   Compare 30.3 per cent of 1974 taxpayers in the $0-$6,000 income category with an 8.7 per cent graduation share of this group.

To the extent that the university system is to be an anti-poverty mechanism, the present Ontario system can hardly qualify as a success. If elitist tendencies are socially or politically unacceptable, certain policy measures may be required in order to increase the relative access of lower-income families. A good example is the case of law, dentistry, and medicare, where the current selection procedures tend to favour student applicants from well-to-do families in general, and in particular from families in which the father himself is a lawyer, dentist, or physician. There are several alternative courses of action to promote more equal access to these professional schools, but the principle of granting preferential treatment or selection to the qualified children of poor families is basic. Least satisfactory would be a quota system under which a certain number of places in medical or law schools could be reserved for children from poor families. Far more suitable would be some type of point system under which equally qualified applicants from low-income groups could be given extra points. Alternatively (and perhaps most suitably), an egalitarian scholarship scheme might be instituted, granting financial aid only to qualified students from poor families, conditional on and well in advance of their admission into law, medicine, or dentistry. Relying exclusively on private full-cost pricing (i.e. charging full-cost fees to all who enter professional schools) would actually enhance the elitist tendencies of these institutions.

Sources and Methods

This appendix describes the simplifying assumptions and methods adopted during the course of this study.

MATCHING FIELDS OF STUDY BETWEEN PSSS AND MCU/SC QUESTIONNAIRES

Our data source for the graduation/income group matrix was the PSSS tape, while starting salaries for university graduates were obtained from the MCU/SC Survey, as explained in the text. Since the two sources employed somewhat different listing of fields of study, the following matching procedure was adopted:

	Field of study	PSSS code	MCU/SC code
1.	Education	132-3	1603
2.	Fine arts	134	1605
3.	Humanities	135-42	1609
4.	Social sciences	143-54	1609
5.	Agric. and Biol. Science	155-59	1607
6.	Engin. and Applied Science	160-62	1604
7.	Health	163-67	1608
8.	Math. and Phys. Science	168-73	1607
9.	General Arts and Science	174	1611

THREE-YEAR AND FOUR-YEAR PROGRAMS OF STUDY

For technical reasons, it was not possible to separate graduates into three-year and four-year programs. All graduates were treated as four-year completers. This assumption was employed both for the calculation of costs as well as benefits.

ACCURACY OF THE PSSS DATA

To ensure the accuracy of the basic PSSS tape data util-
ized for the construction of Table 1, two alternative counts of
the weighted sample were carried out. One using the residence
of respondents and another using the respondents' place of
study. The former count was 101,768 observations, while the
second was 102,502, an insignificant discrepancy.

NON-RESPONSE IN THE PSSS TAPE

From a total weighted Ontario sample of just over 100,000
full-time undergraduate students, about 32 per cent of the
observations could not be used, mainly because the respondents
reported that they did not know their fathers' income. On the
other hand the 68 per cent response rate for UNDERFUL was
significantly higher than for the total PSSS because of the
inclusion of other categories of students with higher non-
response rates, e.g. part-time students. The following were
also included in our non-response category: those reporting
'No Income' and 'Not Reported.'

TABLE A-1: Present values of lifetime earnings for Ontario university male graduates and high school male graduates at 8 per cent discount rate of interest ($000)

Father's income range / Field of study	Less than $2K	$2K to 4K	$4K to 6K	$6K to 10K	$10K to 15K	$15K to 20K	$20K to 25K	$25K and over	Column Total
1 Education	0	0	21286	70901	92500	45232	20033	37876	287828
2 Fine, applied, perform arts	0	0	0	20413	19640	5258	0	11908	57219
3 Humanities	0	0	6118	93612	103429	9330	6424	77245	296158
4 Social sciences	18409	26615	24626	131853	270436	146078	152809	126193	897019
5 Agric. & bio. sciences	5070	25196	7923	3803	46589	22185	14420	17906	143092
6 Engin. & appl. sciences	18613	18281	24762	34069	91405	52849	60493	14458	314930
7 Health professions	0	9515	0	25175	57487	12092	18039	33699	156007
8 Math. & phys. sciences	3169	6338	29950	32644	90643	13628	3169	13469	193010
9 General arts & sciences	0	0	0	150523	179773	90051	0	22841	443188
10 Row total	45261	85945	114665	562993	951902	396703	275387	355595	2788451
11 High School (academic)	24631	46381	63326	308946	521024	217668	151547	195919	1529442
12 Net	20630	39564	51339	254047	430878	179035	123840	159676	1259009

NOTE: Net (Row 12) = Row Total (Row 10) - High School Grad (Row 10).

High school (academic) graduates are eighteen years old with a working life of forty-seven years.

SOURCES: Estimated by author from Statistics Canada 1975 post-secondary student survey, Statistics Canada 1974 graduates data, Statistics Canada Consumer Finance Survey 1974.

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TABLE A-2: Present values of lifetime earnings for Ontario university male graduates and high school male graduates at 9 per cent discount rate of interest ($000)

Father's income range

Field of study	Less than $2K	$2K to 4K	$4K to 6K	$6K to 10K	$10K to 15K	$15K to 20K	$20K to 25K	$25K and over	Column Total
1 Education	0	0	18053	60135	78454	38364	16991	32125	244122
2 Fine, applied, perform arts	0	0	0	17309	16654	4458	0	10097	48518
3 Humanities	0	0	5186	79358	87527	7909	5446	65483	250909
4 Social sciences	15301	22562	20876	111775	229256	123834	129540	106977	760121
5 Agric. & bio. sciences	4302	21376	6722	3226	39525	18821	12234	15191	121397
6 Engin. & appl. sciences	15807	15524	21029	28932	77624	44881	51373	12278	267448
7 Health professions	0	8119	0	21481	49053	10318	15392	28755	133118
8 Math. & phys. sciences	2688	5377	25409	27694	76900	11561	2688	11427	163744
9 General arts & sciences	0	0	0	127800	152634	76456	0	19393	376283
10 Row total	38098	72958	97275	477710	807627	336602	233664	301726	2365660
11 High School (academic)	21021	39583	54045	263665	444660	185766	129335	167204	1305279
12 Net	17077	33375	43230	214045	362967	150836	104329	134502	1060381

NOTE: See Table A-1

SOURCES: See Table A-1

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TABLE A-3: Present values of lifetime earnings for Ontario university male graduates and high school male graduates at 10 per cent discount rate of interest ($000)

Father's income range

Field of study	Less than $2K	$2K to 4K	$4K to 6K	$6K to 10K	$10K to 15K	$15K to 20K	$20K to 25K	$25K and over	Column Total
1 Education	0	0	15453	51474	67155	32839	14544	27498	208963
2 Fine, applied, perform arts	0	0	0	14812	14251	3815	0	8640	41518
3 Humanities	0	0	4437	67894	74883	6767	4659	56023	214663
4 Social sciences	13090	19303	17861	95628	196138	105949	110827	91523	650315
5 Agric. & bio. sciences	3683	18302	5755	2762	33842	16115	10474	13007	103940
6 Engin. & appl. sciences	13547	13305	18023	24797	66529	38465	44030	10523	229219
7 Health professions	0	6992	0	18501	42248	8886	13257	24766	114650
8 Math. & phys. sciences	2302	4604	21755	23712	65842	9899	2302	9784	140200
9 General arts & sciences	0	0	0	109506	130786	65512	0	16617	322421
10 Row total	33622	62506	83284	409806	691674	288243	20093	258381	2025889
11 High School (academic)	18118	34117	46581	227255	383257	160113	111475	144114	1125030
12 Net	14504	28389	36703	181831	308417	128130	88618	114267	900859

NOTE: See Table A-1.

SOURCES: See Table A-1.

TABLE A-4: Present values of lifetime earnings for Ontario university male graduates and high school male graduates at 11 per cent discount rate of interest ($000)

Father's income range Field of study	Less than $2K	$2K to 4K	$4K to 6K	$6K to 10K	$10K to 15K	$15K to 20K	$20K to 25K	$25K and over	Column Total
1 Education	0	0	13339	44431	57966	28345	12554	23735	180370
2 Fine, applied, perform arts	0	0	0	12782	12298	3292	0	7456	35828
3 Humanities	0	0	3828	58574	64604	5838	4019	48333	185196
4 Social sciences	11293	16653	15409	82502	169215	91403	95614	78960	561049
5 Agric. & bio. sciences	3180	15802	4969	2385	29219	13913	9044	11230	89742
6 Engin. & appl. sciences	11708	11499	15576	21431	57498	33244	38053	9095	198104
7 Health professions	0	6073	0	16070	36696	7718	11514	21511	99582
8 Math. & phys. sciences	1987	3975	18783	20473	56848	8547	1987	8447	121047
9 General arts & sciences	0	0	0	94620	113008	56607	0	14358	278593
10 Row total	28168	54002	71904	353268	597352	248907	172785	223125	1749511
11 High School (academic)	15757	29671	40512	197644	333318	139250	96950	125336	978438
12 Net	12411	24331	31392	155624	264034	109657	75835	97789	771073

NOTE: See Table A-1.

SOURCES: See Table A-1.

TABLE A-5: Present values of lifetime earnings for Ontario university male graduates and high school male graduates at 12 per cent discount rate of interest ($000)

Father's income range / Field of study	Less than $2K	$2K to 4K	$4K to 6K	$6K to 10K	$10K to 15K	$15K to 20K	$20K to 25K	$25K and over	Column Total
1 Education	0	0	11602	38645	50418	24654	10919	20645	156883
2 Fine, applied, perform arts	0	0	0	11115	10694	2863	0	6483	31155
3 Humanities	0	0	3328	50922	56164	5075	3494	42019	161002
4 Social sciences	10172	14999	13879	74309	152412	82326	86119	71119	505335
5 Agric. & bio. sciences	2766	13748	4323	2075	25421	12105	7868	9770	78076
6 Engin. & appl. sciences	10196	10014	13565	18664	50074	28951	33140	7920	172524
7 Health professions	0	5315	0	14065	32117	6755	10078	18827	87157
8 Math. & phys. sciences	1729	3458	16342	17812	49459	7436	1729	7349	105314
9 General arts & sciences	0	0	0	82384	98393	49286	0	12501	242564
10 Row total	24863	47534	63039	309991	525152	219451	153347	196633	1540010
11 High School (academic)	13817	26017	35522	173302	292267	122100	85009	109900	857934
12 Net	11046	21517	27517	136689	232885	97351	68338	86733	682076

NOTE: See Table A-1.

SOURCES: See Table A-1.

TABLE A-6: Total tax payments (including federal/provincial and local) by income groups ($ million)

Income Group	1970 Amount	1970 %	1969 Amount	1969 %
$ 0 - 2,000	434.5	1.7	536.8	2.1
$ 2,000 - 3,000	421.7	1.6	590.9	2.4
$ 3,000 - 4,000	764.4	3.0	838.3	3.4
$ 4,000 - 5,000	882.4	3.4	1,063.4	4.3
$ 5,000 - 6,000	1,038.1	4.0	1,368.6	5.5
$ 6,000 - 7,000	1,327.6	5.1	1,679.3	6.8
$ 7,000 - 8,000	1,450.2	5.6		
$ 8,000 - 9,000	1,765.2	6.8	5,770.2	23.2
$ 9,000 - 10,000	1,814.8	7.0		
$10,000 - 11,000	1,662.0	6.4		
$11,000 - 12,000	1,699.0	6.6		
$12,000 - 13,000	1,437.6	5.6	6,790.6	27.3
$13,000 - 14,000	1,274.3	4.9		
$14,000 - 15,000	1,093.0	4.2		
$15,000 and over	8,765.4	33.9	6,190.3	24.9
TOTAL	25,830.6	100.0	24,852.6	100.0

NOTE: For 1970, D.A. Dodge, 'Impact of Tax Transfer and Expenditure Policies of Government on the Distribution of Personal Income in Canada,' *Review of Income and Wealth*, Series 21, No. 1, March 1975, Table 7, 30. For 1969, W.I. Gillespie, 'On the Redistribution of Income in Canada,' *Canadian Tax Journal*, Vol. 24, No. 4, July, August 1976, Table A-6, 444.

TABLE A-7: Distribution of scholarships and loans by level of government and income groups Ontario male university students 1974-5

Father's income Categories	Less than $2K	%	$2K to 4K	%	$4K to 6K	%	$6K to 10K	%	$10K to 15K	%	$15K to 20K	%	$20K to 25K	%	$25K and over	%	Total
A N	880	2.24	673	1.72	1692	4.31	6535	16.66	12013	30.63	5538	14.21	5128	13.07	6765	17.25	39224
Total	0.0	0.00	226418	9.81	123694	5.36	329411	14.28	835791	36.23	525899	22.79	138777	6.02	127097	5.51	2307087
B N	880	2.24	673	1.72	1692	4.31	6535	16.66	12013	30.63	5538	14.12	5128	13.07	6765	17.25	39224
Total	495708	6.94	277788	3.89	1243519	17.41	1132642	15.85	1775514	24.84	1118176	15.65	526126	7.36	576506	8.07	7145979
C N	577	1.63	408	1.38	1587	4.50	5485	15.54	10554	29.90	4861	13.77	4961	14.05	6787	19.23	35300
Total	145826	3.01	314462	6.48	706052	14.56	942344	19.43	1307743	26.96	830299	17.12	304308	6.27	299779	6.18	4850813
D N	538	1.51	489	1.38	1559	4.38	5814	16.35	10511	29.56	4871	13.70	5020	14.21	6761	19.01	35563
Total	255334	5.21	156916	3.20	459500	9.37	1446460	29.49	1688047	34.42	523328	10.67	149340	3.04	225732	4.60	4904657
A+B+C+D Total	896868	4.67	975584	5.08	2532765	13.19	3850857	20.05	5607095	29.19	2997702	15.61	1118551	5.82	1229114	6.40	19208536

NOTE: A is a scholarship from the federal government for Ontario male undergrads; B is a scholarship from provincial government for Ontario male undergrads; C is a loan from the Canada student loan plan for Ontario male undergrads; D is a loan from the provincial student loan plan for Ontario male undergrads; and N is the number of observations.

SOURCE: Statcan 1975 Post-Secondary Student Survey

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TABLE A-8: Scholarships from federal and provincial sources for Ontario university students

Variable	Mean	Coefficients	T-statistics	F-statistics
TSCHOL	271.516			
1 SUMO1	0.1201	32.0689	0.78	
2 SUMO2	0.0613	214.340	3.77**	7.99*
3 SEXO1	0.4256	39.9598	1.42	2.03
4 AGE10	20.8818	56.2420	8.36*	69.86*
5 MARO1	0.1035	444.413	8.68*	
6 MARO2	0.0068	−270.350	1.64	41.20*
7 DISTO1	0.2662	−123.756	1.84	
8 DISTO2	0.1801	− 29.4651	0.65	
9 DISTO3	0.3264	− 5.89423	0.15	1.36
10 DISTAO1	0.1971	− 53.9285	1.53	
11 DISTAO2	0.2466	6.9119	0.11	
12 DISTAO3	0.0860	− 83.4612	1.64	1.40
13 LANGO1	0.0903	−110.127	2.24**	5.0**
14 LFMO1	0.5943	− 6.6123	0.18	0.03
15 OCCFO1	0.8502	78.6789	1.70	
16 OCCFO2	0.0072	323.081	2.01**	
17 OCCFO3	0.0044	82.5158	0.40	
18 OCCFO4	0.0079	835.226	5.32*	7.71*
19 INCM	2.9110	− 1.7089	0.42	0.18
20 INCF	13.9541	− 17.047	7.64*	58.41*
21 EDMO1	0.01396	−194.95	1.28	
22 EDMO2	0.3876	− 66.6472	0.96	

Variable	Mean	Coefficients	T-statistics	F-statistics
23 EDMO3	0.1997	26.7314	0.39	
24 EDMO4	0.2552	47.6098	0.75	
25 EDMO5	0.0863	− 22.3401	0.17	2.29**
26 EDFO1	0.0112	−106.163	0.69	
27 EDFO2	0.3775	− 55.1014	1.24	
28 EDFO3	0.1380	− 72.4754	1.42	
29 EDFO4	0.1868	− 54.1991	1.18	
30 EDFO5	0.0885	− 1.07786	0.01	0.53
31 SIBLO1	0.0525	− 39.4986	0.64	0.41
32 BORO1	0.5068	−190.145	6.30*	39.69*
CONSTANT		−585.283	3.44	

NOTE: R^2 = 0.27849; Error Std, Dev. = 544.778; Valid obs. = 1737; * means significant at 1 per cent level; ** means significant at 5 per cent level.

SOURCE: PSSS 1974 Tape

TABLE A-9: Loans from Canada and provincial student loan plan for Ontario
university students

Variables	Mean	Regression coefficients	T-statistics	Group F-statistics
Total loan	292.829	Dependant variable		
SUMO1	0.117	5.76	0.26	
SUMO2	0.059	128.63	4.15*	8.61**
SEXO1	0.426	48.65	3.22*	10.38*
AGE10	20.806	0.16	0.04	0.00
MARO1	0.097	80.18	2.86*	
MARO2	0.006	−73.02	0.79	4.75*
DISTO1	0.273	−53.55	1.54	
DISTO2	0.180	− 6.33	0.26	
DISTO3	0.313	42.11	1.92	4.24*
DISTAO1	0.294	−16.34	0.85	
DISTAO2	0.253	43.92	1.38	
DISTAO3	0.082	39.13	1.40	1.80
LANGO1	0.092	45.23	1.74	3.02
LFMO1	0.594	39.35	2.03**	4.11**
OCCFO1	0.846	41.96	1.71	
OCCFO2	0.010	186.04	2.47**	
OCCFO3	0.004	90.13	0.81	
OCCFO4	0.007	42.09	0.48	1.92
INCM	2.95	0.24	0.11	0.01
INCF	14.513	−10.10	8.28*	68.50*
EDMO1	0.014	43.74	0.56	

Variables	Mean	Regression coefficients	T-statistics	Group F-statistics
EDMO2	0.376	16.28	0.46	
EDMO3	0.189	26.81	0.76	
EDMO4	0.277	43.01	1.34	
EDMO5	0.078	10.53	0.15	0.61
EDFO1	0.013	63.67	0.83	
EDFO2	0.367	− 6.97	0.29	
EDFO3	0.134	− 41.68	1.54	
EDFO4	0.184	6.11	0.25	
EDFO5	0.080	63.03	0.97	1.25
SIBLO1	0.600	− 3.69	0.12	0.01
BORO1	0.556	−588.49	35.72*	1276.02*
CONSTANT		630.53	6.90	

NOTE: R^2 = 0.60; E.S.D. = 280.01; Obs. = 1600; * means significant at 1 per cent level; and ** means significant at 5 per cent level.

SOURCE: PSSS 1974 Tape

TABLE A-10: Definitions of variables

Group 1		Summer job
SUMO1	–	Part-time summer job
SUMO2	–	Summer activities other than part-time job or full-time job
DUMMY	–	Full-time summer job

Group 2		Sex
SEXO1	–	Female
DUMMY	–	Male

Group 3		Age
AGE10	–	Age of students (continuous variable)

Group 4		Marital status
MARO1	–	Married
MARO2	–	Divorced, separated, etc.
DUMMY	–	Single

Group 5		Distance from permanent home
DISTO1	–	6 to 20 miles
DISTO2	–	21 to 100 miles
DISTO3	–	above 100 miles
DUMMY	–	less than or equal to 5 miles

Group 6		Distance from accomodation
DISTAO1	–	1 to 5 miles
DISTAO2	–	6 to 20 miles
DISTAO3	–	over 20 miles
DUMMY	–	under 1 mile

Group 7		Language used at home
LANGO1	–	Any language other than English
DUMMY	–	English

TABLE A-10 (Cont'd)

Group 8		Labour force status of mother
LFMO1	—	Not in active labour force
DUMMY	—	Employed or self-employed

Group 9		Occupation of father
OCCFO1	—	Entertainers, athletes, or unclassified
OCCFO2	—	Paraprofessional
OCCFO3	—	Skilled craftsmen
OCCFO4	—	Labourers
DUMMY	—	Professionals

Group 10		Income of mother
INCM	—	Means of income ranges (continuous variable)

Group 11		Income of father
INCF	—	Means of income ranges (continuous variable)

Group 12		Education of mother
EDMO1	—	No formal schooling
EDMO2	—	Some high school
EDMO3	—	High school graduate
EDMO4	—	Technical college or some university
EDMO5	—	Not reported or don't know
DUMMY	—	University graduate

Group 13		Education of father
EDFO1	—	No formal schooling
EDFO2	—	Some high school
EDFO3	—	High school graduate
EDFO4	—	Technical college or some university
EDFO5	—	Not reported or don't know
DUMMY	—	University graduate

TABLE A-10 (Cont'd)

Group 14		Any brother or sister
SIBLO1	-	No brother or sister, or not reported
DUMMY	-	Has brother or sister

Group 15		Ever borrowed for post-secondary education
BORO1	-	Never or not reported
DUMMY	-	Has borrowed

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